Viral Hepatitis Transmission in the United States

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Features of HBV & HCV Infection

		HCV Infection	HBV Infection
Pathogen		RNA virus	DNA virus
Incubation period	Average:	6–7 wks	8–12 wks
	Range:	2–26 wks	6–26 wks
Clinical illness (jaundice)		20%–30%	< 5 yrs: <10% > 5 yrs: 30–50%
Chronic hepatitis		~70%	< 5 yrs: 30–90% Older children: 6–10% Adults: <5%

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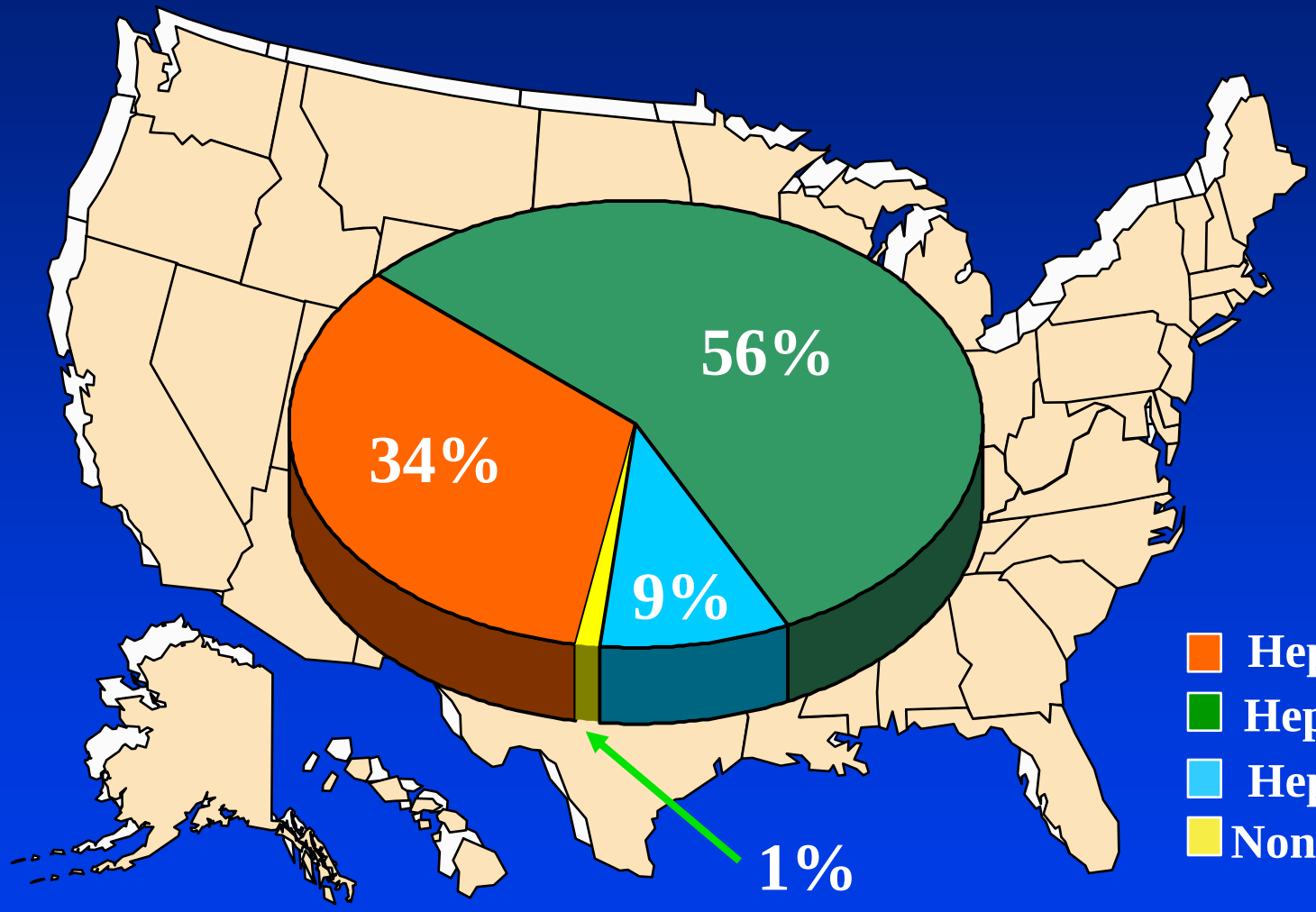
Disease Burden from Hepatitis B & Hepatitis C in the United States

Outcome	HBV	HCV
Percent ever infected	4.9%	1.6%
# chronic infections	~1.2 million	~3.2 million
# new infections/yr	~60,000	~30,000
# deaths/yr	~5,000	~10,000

Acute Viral Hepatitis, United States, 2001-2004



Source: Sentinel Counties Study, CDC

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Transmission of Bloodborne Viral Infections

Route	Mode
Percutaneous	
➢ Apparent	injection drug use needle stick injury
➢ Inapparent	blood/ serous fluid
Permucosal	sex perinatal

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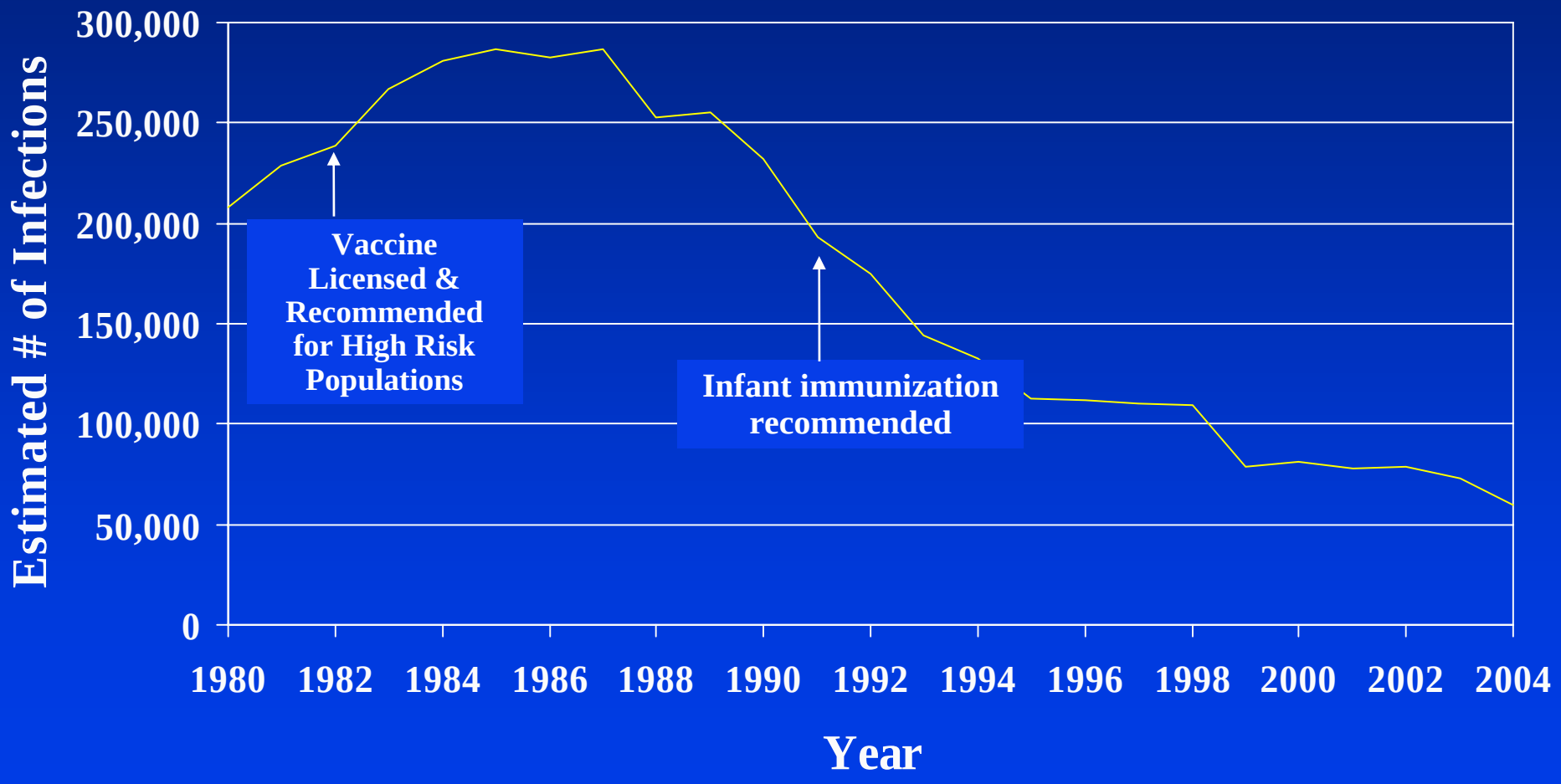
Relative Transmission Efficiency of Bloodborne Viral Infections

	HBV	HCV	HIV
Injection drug use	+++	++++	++
Sexual	+++	+	++
Perinatal	++++	+	++
Occupational	+++	+/-	+/-

Epidemiology of Acute Hepatitis B in the United States

Estimated Number of Acute HBV Infections, United States, 1980-2004



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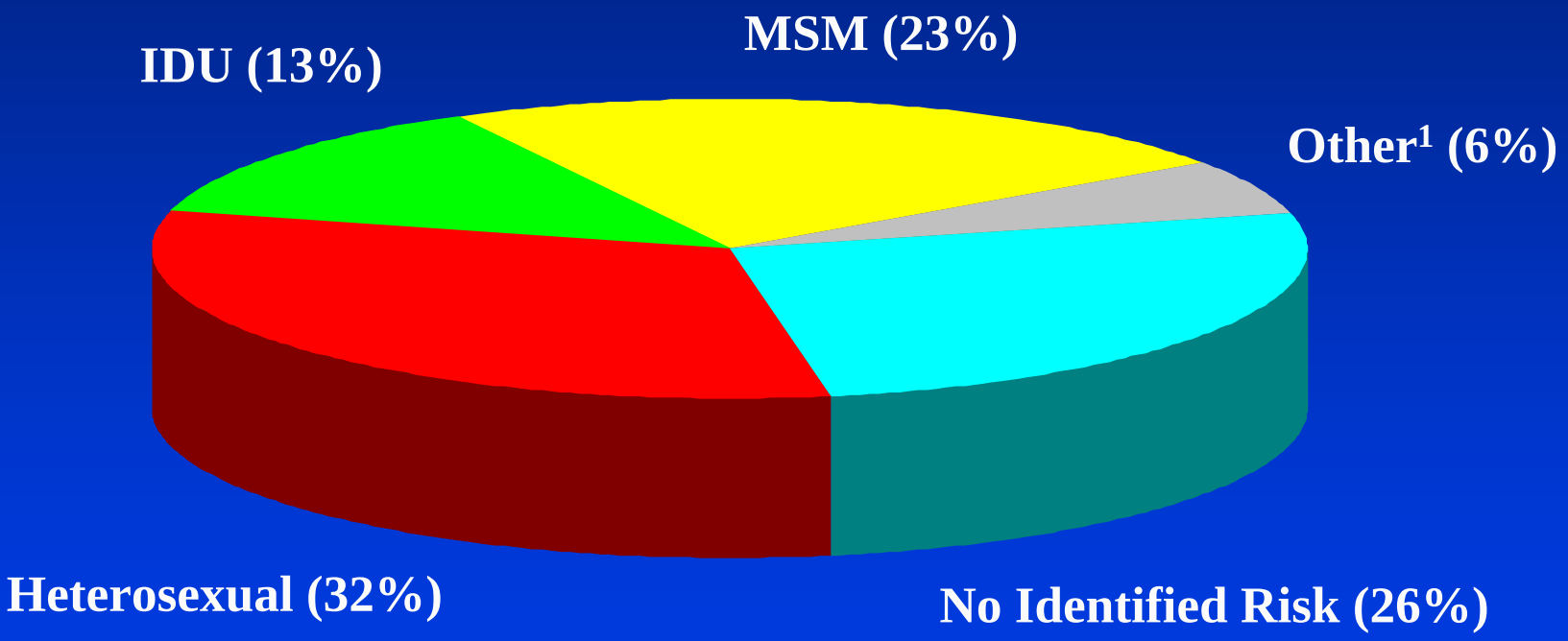
Reported Risk Factors for Acute Hepatitis B, United States, 2001-2004



[1] Other: Household contact, institutionalization, hemodialysis, blood transfusion, occupational exposure

Source: Sentinel Counties Study of Acute Viral Hepatitis, CDC

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Transfusion Associated Hepatitis B Cases Reported in the National Notifiable Disease Surveillance System, 2003

- Validation study of cases of acute symptomatic hepatitis B reported to the CDC from State health departments with transfusion reported as a risk factor for infection
- Of 7526 reported cases, 49 were reported with "transfusion" as a risk factor for infection
  - Only 10 had acute hepatitis B and were transfused during the exposure period
  - Only 1 with an infected donor (who was in the "window period" of infection)

Recent Case Reports of HBV Infection Following Blood Transfusion

Case Report 1: HBV Infection Following Blood Transfusion: New York, 2004

- A 60 year old woman developed acute hepatitis B in Sept, 2004 and died
  - No traditional risk factors for infection
  - Received four units packed red blood cells in May, 2004
- All four donors tested
  - One donor found to have become infected with HBV since donation
    - He admitted multiple male sex partners in 3 months prior to donation which was not disclosed at donation
    - No archived specimen for testing
- Likely donor was in the early incubation period of HBV infection

CDC

Case Report 2: HBV Infection Following Blood Transfusion: Texas, 2004

- Repeat donor was found to be HBsAg positive in August, 2004
  - Previous donation in June, 2004 (HBsAg & anti-HBc negative) was traced to single recipient
- Recipient developed acute hepatitis B in Sept, 2004
- Donor did not disclose any risk factors at time or donation in June or August or upon re-interview
- Likely donor was in the early incubation period of HBV infection

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Implications of Recent Investigations of HBV Infection Following Blood Transfusion

- Transfusion transmitted HBV infection is a rare event
  - Risk of collecting HBV infectious blood in the window period is 1 in ~200,000 donations
  - When transmission has been observed, it has been due to “window period” donations and not testing errors
- Donor deferrals based on geographic, medical and behavioral factors are a first line of defense
  - Depends on donor honesty

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Immunization Strategy to Eliminate Transmission of HBV Infection in the United States

- Universal vaccination of all infants beginning at birth
- Prevention of perinatal HBV infection though
  - Routine screening of all pregnant women for HBsAg, and
  - Immunoprophylaxis of infants born to HBsAg positive women and infants born to women with unknown HBsAg status
- Routine vaccination previously unvaccinated children and adolescents
- Vaccination of previously unvaccinated adults at increased risk of infection

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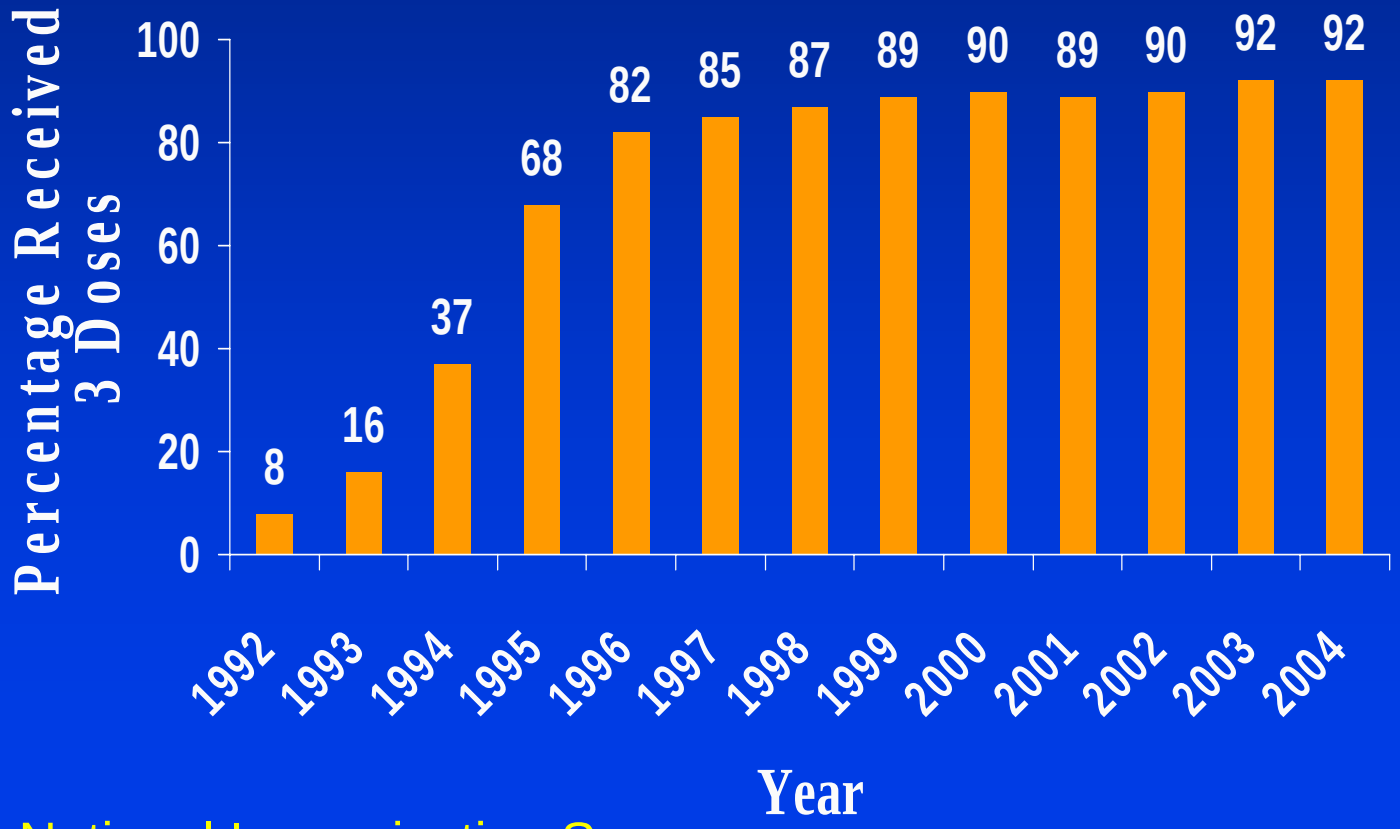
Hepatitis B Vaccine 3 Dose Coverage Among 19-35 Month Old Children, by Year of Survey, 1992-2004*



*Source: National Immunization Survey

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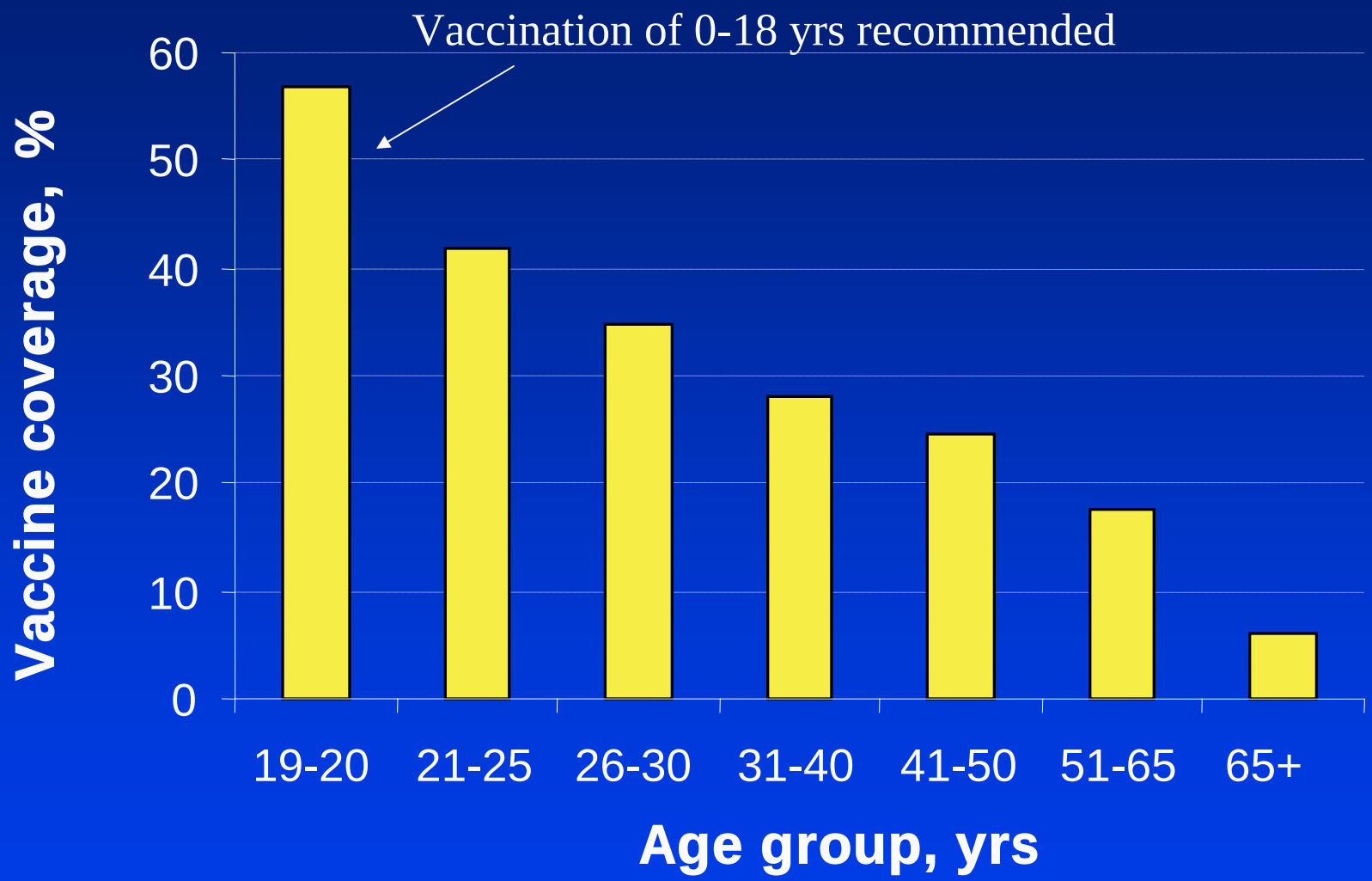
Adult Hepatitis B Vaccine Coverage, 2002



National Health Interview Survey

CDC

Estimated Hepatitis B Vaccine Coverage in Adults

Risk Group	Coverage Estimate (year, site)
Dialysis patients	60% (2001, national)
Occupationally-exposed workers	75% (2002-3, national)
Men who have sex with men	32% (1998-2000, YMS*)
Injection drug users	40% (2002-2004, DUIT**)
STD clinic clients	10% (1998-2001, San Diego)

* Young Men's Survey: participants 22-29 years of age

** Drug User Intervention Trial: participants 15-30 years of age

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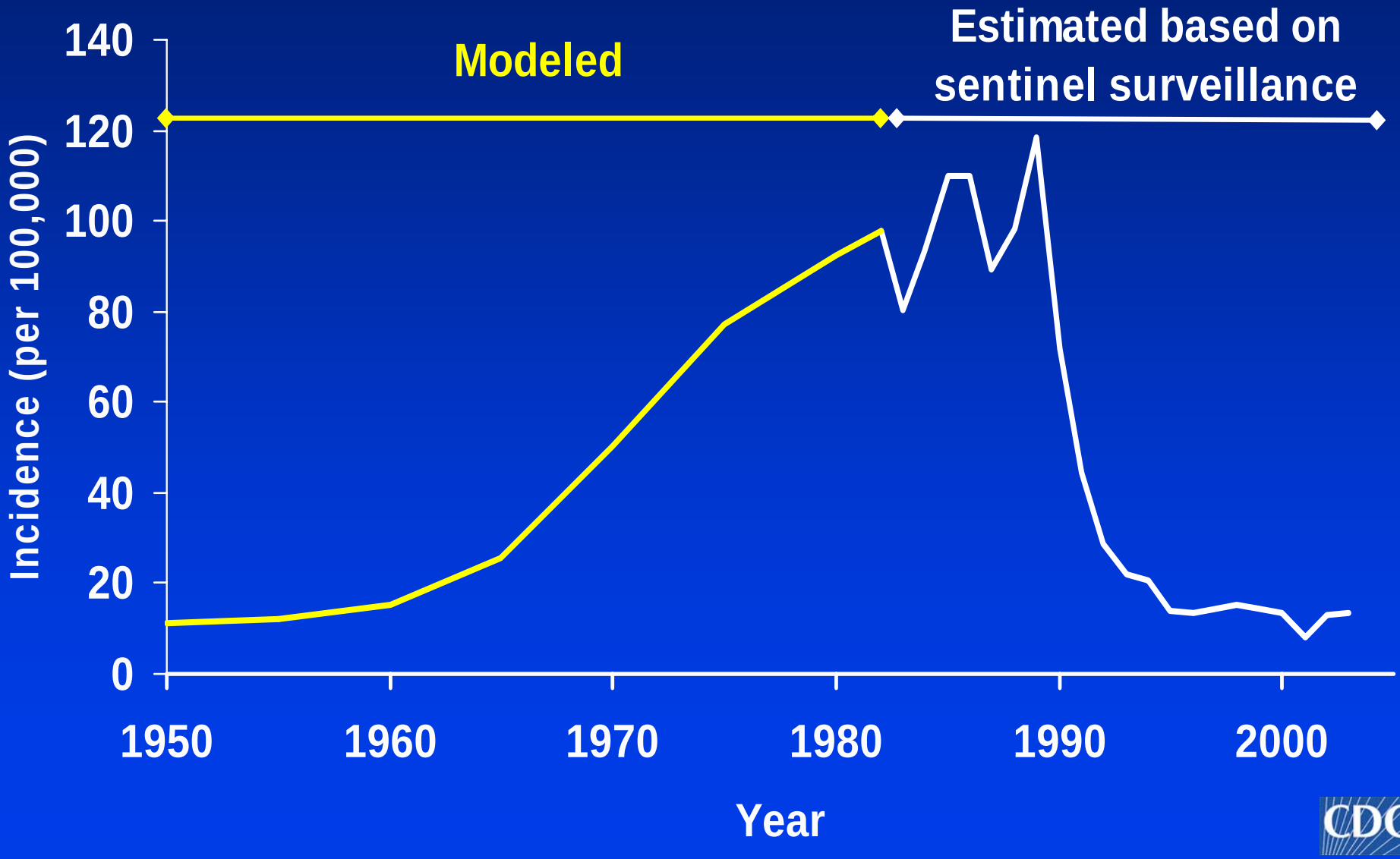
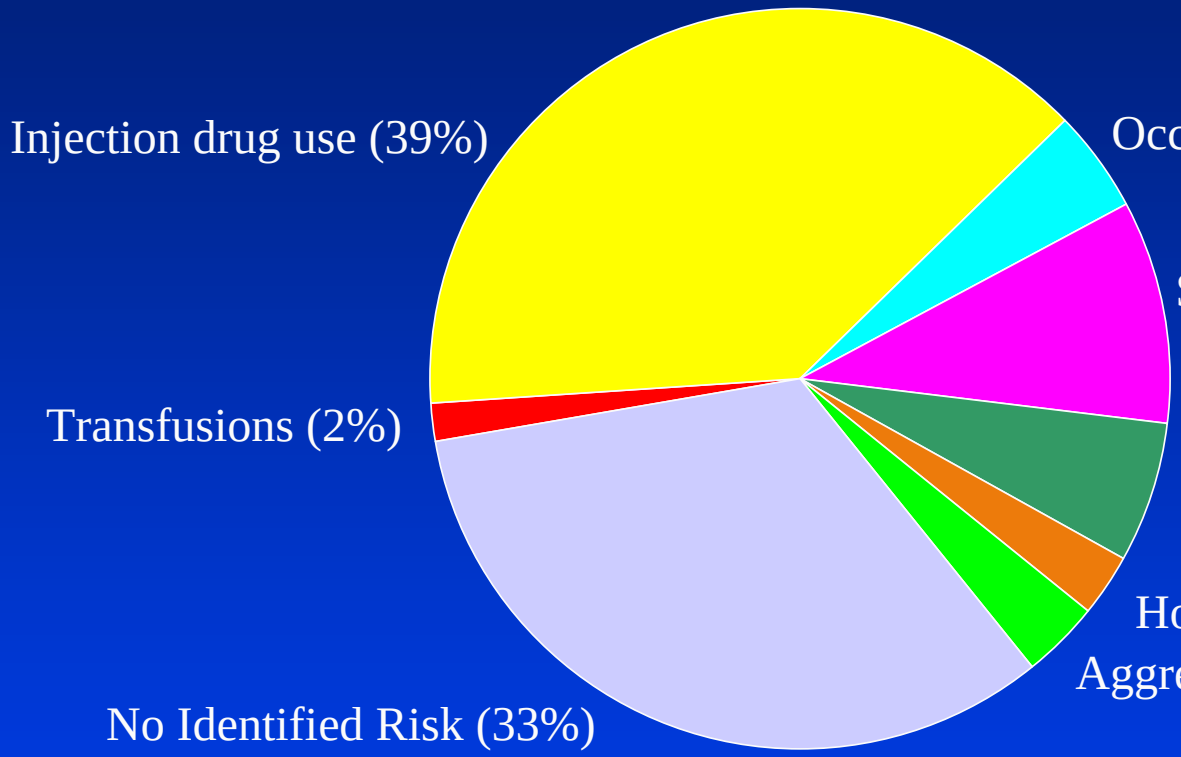
Epidemiology of Acute Hepatitis C in the United States

Incidence of Acute HCV Infection, United States



Reported Risk Factors for Acute Hepatitis C, United States, 2001-2004



•*Aggregate risk factor = Case shown a list of risk factors and admits to one, but does not specify which one

Source: Sentinel Counties Study of Acute Viral Hepatitis, CDC

Transfusion Associated Hepatitis C Cases Reported in the National Notifiable Disease Surveillance System, 2003

- Validation study of cases of acute symptomatic hepatitis C reported to the CDC from State health departments with transfusion reported as a risk factor for infection
- Of 891 reported cases, 16 were reported with "transfusion" as a risk factor for infection
  - Only 1 had acute hepatitis C and was transfused during the exposure period
    - Received blood/blood products from six donors
    - Four of six donors re-tested and found to be uninfected

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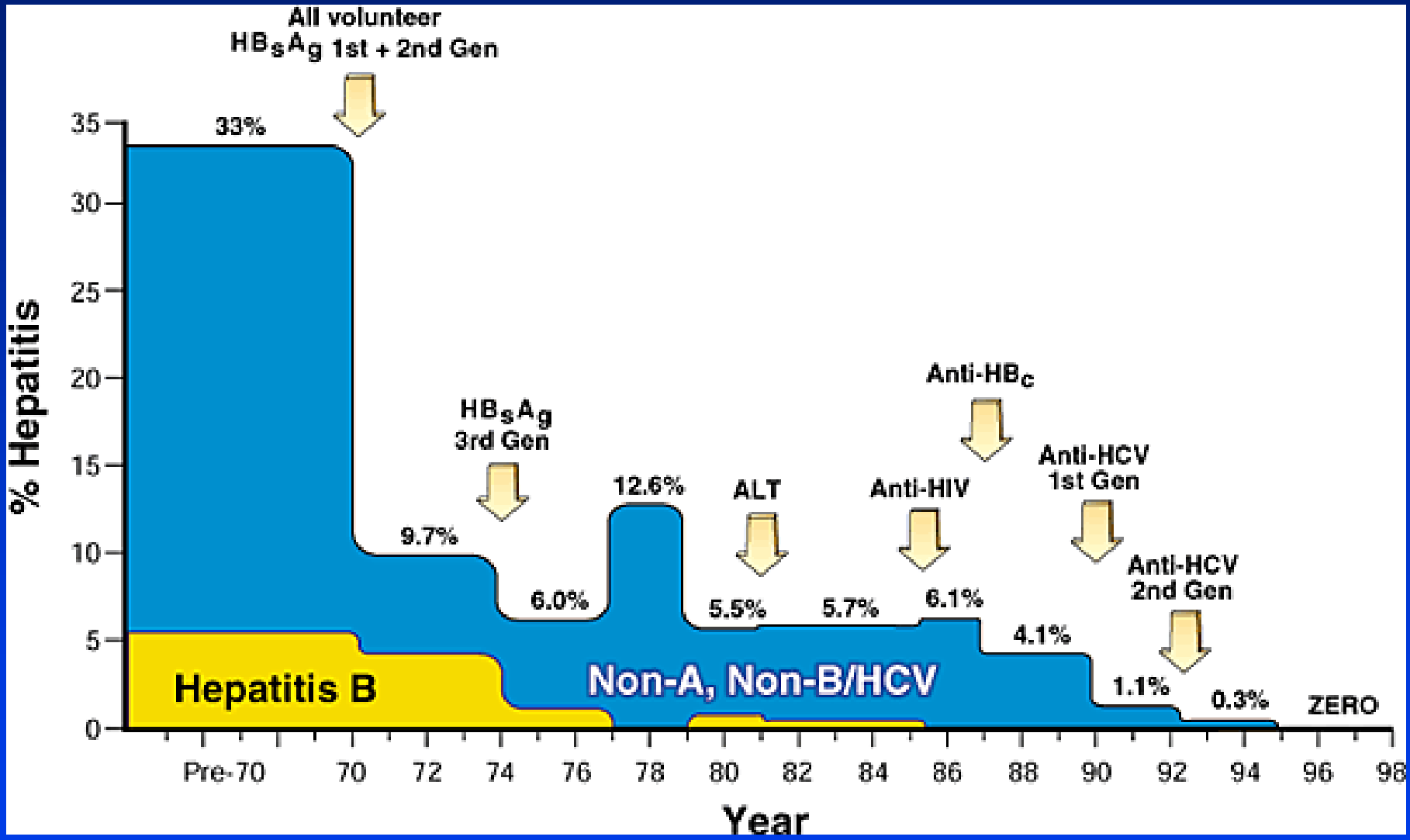
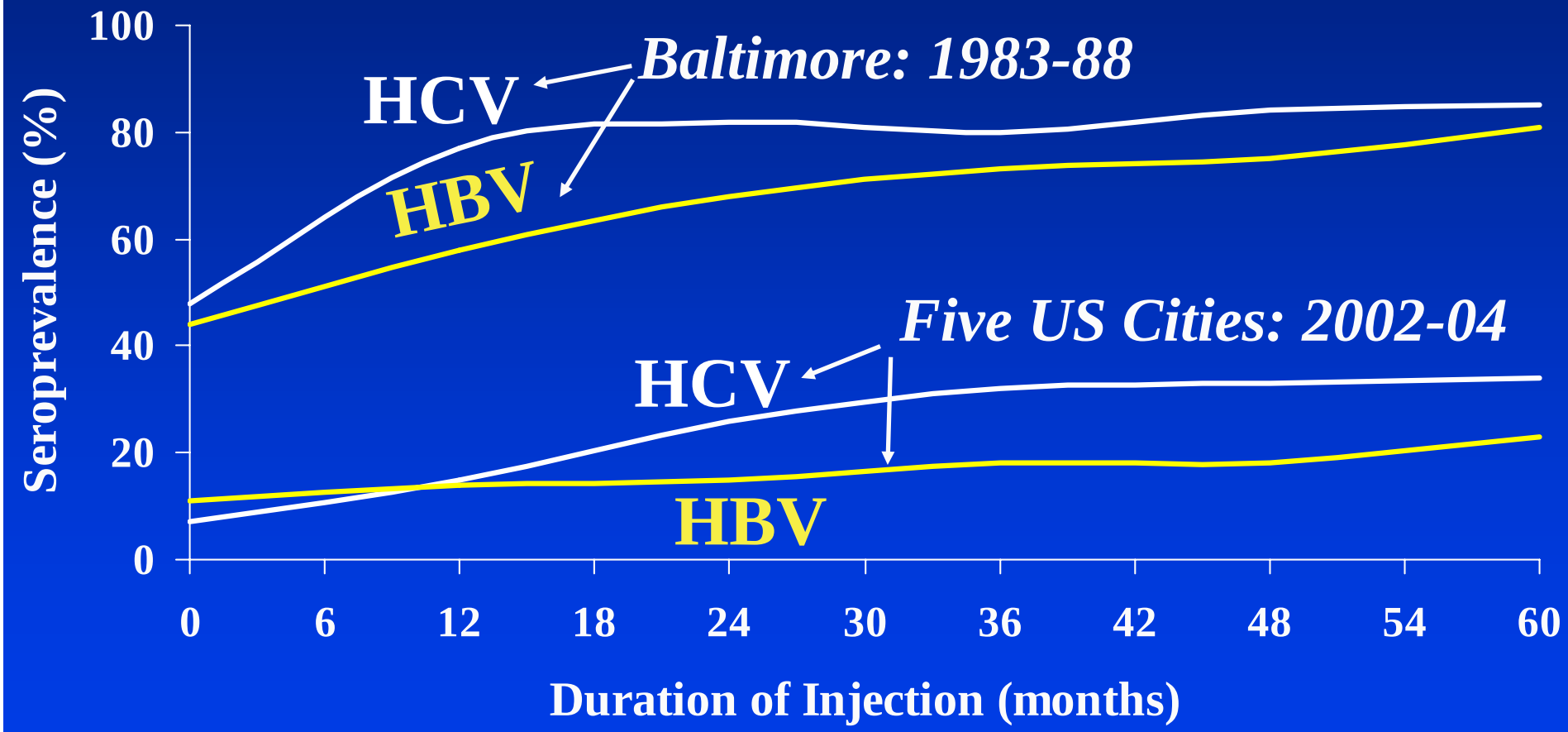
Posttransfusion Hepatitis, United States



Alter HJ and Houghton M. Hepatitis C virus and eliminating post-transfusion hepatitis. Nature Medicine 2000;6:1082-6.

Prevalence of HCV & HBV Infection Among Injection Drug Users in Two Time Periods



Garfein RS *Am J Public Health* 1996; 86:655 & Collaborative Injection Drug User Study III (CIDUSIII)/Drug Users Intervention Trial (DUIT): Baltimore, Chicago, Los Angeles, New York City, Seattle. CDC unpublished data.

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Recent Reports of Clusters of Acute HCV Infection Among Men who have Sex with Men (MSM) in Europe

Sexual Transmission of HCV

- Sexual transmission of HCV occurs, but efficiency is low
  - Rare between long-term steady partners
  - MSM at no higher risk than sexually active heterosexuals
- Factors that facilitate transmission between partners unknown (e.g., viral titer, other STDs)

Clusters of Acute HCV Infection Among MSM in Europe

- Case report 1: France
  - Five HIV-infected MSM with acute HCV infection identified at a single clinic in a 13 month period
    - Denied IDU or other parenteral risk factors for infection
    - All reported unprotected anal intercourse and had concomitant syphilis
- Case report 2: The Netherlands
  - Seven MSM with acute HCV infection identified among 15 sexual contacts
    - Denied IDU or other parenteral risk factors for infection
    - All reported unprotected anal intercourse and sexual practices that included fisting
    - 6 of 7 cases had concomitant rectal lymphogranuloma venereum (LGV)
    - 6 of 7 cases were HIV infected

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Clusters of Acute HCV Infection Among MSM in Europe (II)

- No such clusters identified in the United States
  - Rare event or under reporting?
  - Difficult to study
  - Role of unreported IDU
- Need for further studies

Estimates of Past HBV and HCV Infection in Selected Populations in the United States

Caveats About Estimates of HBV and HCV Infection in Selected Populations

- Incidence does not equate with prevalence
  - Age/cohort/period effects: Changes in disease rate according to age, year of birth, & point in calendar time
  - In-migration and out-migration
- Geographic differences in prevalence
  - Urban v. rural or city v. city
- Individuals may have multiple risk factors
  - Belong to several population subgroups (e.g. MSM and IDU)
- External Validity: Ability to generalize results to "larger" population of interest
  - Where/how subjects selected (STD clinic v. street recruit)

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More Caveats About Estimates of HBV and HCV Infection in Selected Populations

- Prevalence of past infection v. prevalence of chronic infection
  - ~10% of persons in the US with past HBV infection (anti-HBc+) have chronic infection (HBsAg+)
    - In the general US population:
      - 4.9% of persons have evidence of past infection (anti-HBc+)
      - 0.4% have evidence of chronic infection (HBsAg+)
  - ~75% of persons with past HCV infection (anti-HCV+) have chronic infection (HCV RNA+)
    - In the general US population:
      - 1.6% of persons have evidence of past infection (anti-HCV+)
      - 1.3% have evidence of chronic infection (HCV RNA+)

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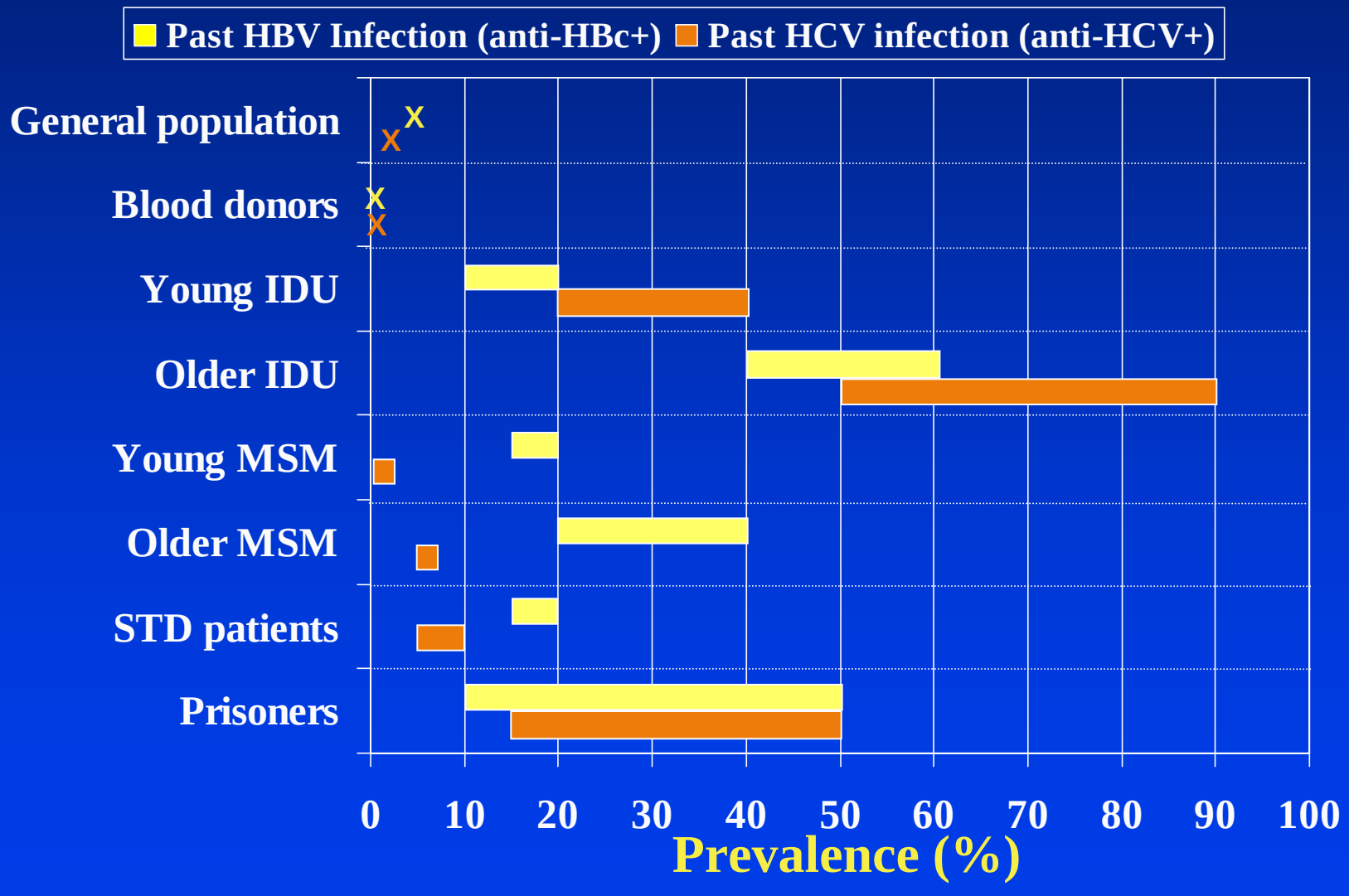
Estimates of Past HBV (anti-HBc) & HCV (anti-HCV) Infection in Selected US Populations



Summary

- Incidence of acute HBV and HCV infection has declined in the past two decades
  - Primary risk factors remain unchanged
  - Impact of hepatitis B vaccination
- Transfusion historically was an important risk factor for infection (especially for HCV infection), but currently is extremely rare
  - When transmission has been observed, it has been due to "window period" donations and not testing errors
- Prevalent infections more common than acute infections
- Prevalence lower in younger age groups

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CDC's Division of Viral Hepatitis

http://www.cdc.gov/hepatitis